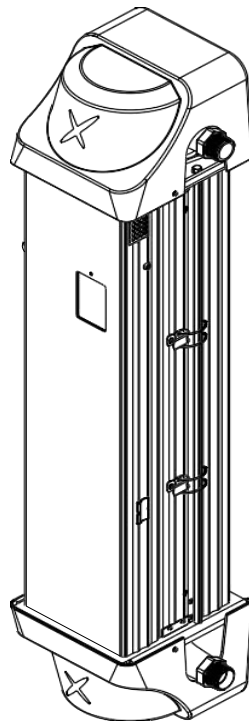


# Hallett

UV  
PURE

## Troubleshooting Guide.



CROSS X FIRE TECHNOLOGY

## Hallett 500,750,1000



## Introduction

The Hallett unit is capable of providing a vast amount of information to observe, record, and troubleshoot its performance. This document provides detailed information on the common faults that may occur, where to review system information, and the steps to take for troubleshooting.

**Please refer to the Instruction Manual first for all safety information.**

[https://www.whiteint.co.nz/documents/Manuals/807756\\_500.pdf](https://www.whiteint.co.nz/documents/Manuals/807756_500.pdf)

The manual provides detailed instructions for inspection, cleaning, disassembly and part number for spare parts.

A copy of the Technicians Annual Service Guide may also prove helpful.

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There are two types of notifications, WARNINGS and ALARMS.

A **WARNING** is a condition that, if not addressed, could impact the unit's performance. Warnings should be addressed as soon as possible.

Warnings are accompanied by a flashing red LED, a single beep, a message, and a yellow screen. The unit is still able to treat during a warning condition – the RUN contact remains closed, the shutoff solenoid valve (if installed) remains energized, and the WARNING contact is closed.

Warnings are described in detail starting on page 21.

An **alarm** is a condition that has significantly impacted the unit's performance and it must be addressed **IMMEDIATELY**.

Alarms are accompanied by a solid red LED, continuous beeping, a message, and a red screen. When an alarm is active, the unit is no longer in Treatment Mode condition – the RUN contact opens and the shutoff solenoid valve (if installed) is de-energized.

Alarms are described in detail starting on page 10.

In every case the first step is to review the Message History and System Parameters.

It is important to know where this information is kept in the unit so some time should be taken to become familiar with the menus.

A full system inspection including the UV chamber is also advisable after reviewing information provided by the unit.

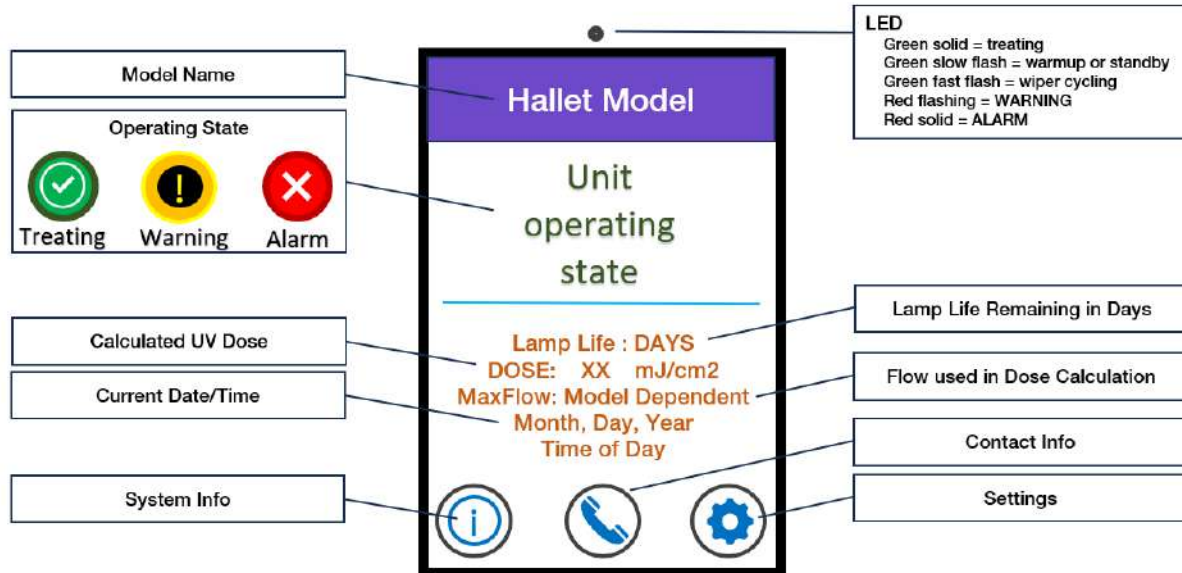
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## 1. Reviewing the main operational parameters

Touch the display screen to wake it

From the main display screen, record the current UV Dose, UVI and UVT values



## 2. Dose Alarming - General

If a dose alarm occurs it means there is insufficient UV dose to treat the maximum flow rate prescribed by the unit.

The Dose Alarm may be due to low UV Intensity (UVI) OR low UV Transmittance (UVT) OR a combination of both.

Review both values in the System Info Menu to determine which is causing the alarm and take corrective action.

UV Transmittance (UVT) is NOT directly related to water clarity.

It is good practice to submit a UVT sample to an accredited laboratory to confirm system prediction.


Note that for any surface water application, or shallow wells under the influence of surface water, the UVT will vary considerably and will be impacted seasonally.

Organic matter (tannins) in the water absorbs the UV light and this reduces the UVT of the water.

As the organic matter is dissolved in the water it cannot be filtered out even with 1 micron filters. Equipment such as tannin removal devices may be required for pretreatment.

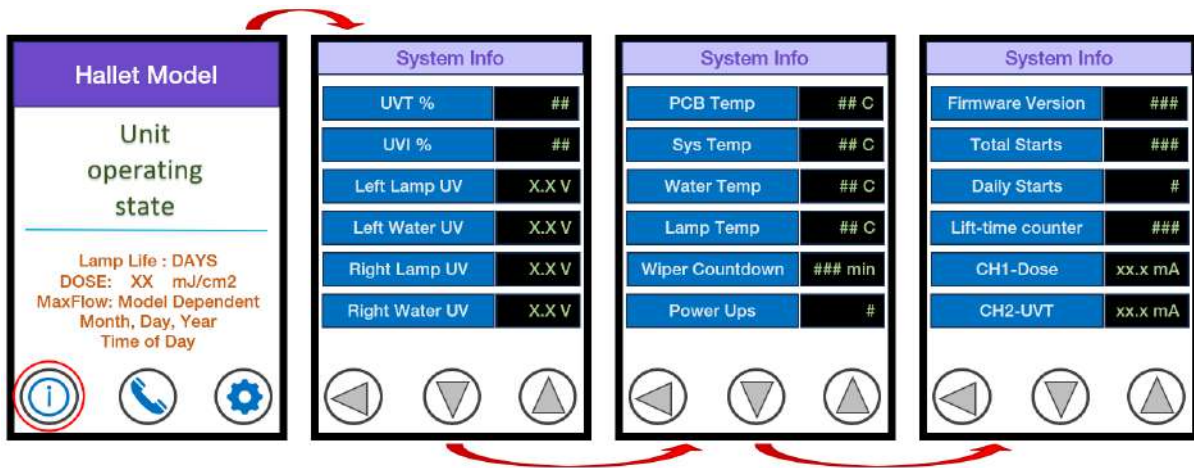
### 3. Reviewing the System Info screens.



Press the information button. Use the DOWN button  to scroll

Record the values

1. Record the total lamp starts.
2. Total Starts
3. Power Ups
4. Lifetime counter
5. Check the unit message history.



Two of the most useful parameters for troubleshooting, seen on the first page of the System Info, are the UV Transmittance (UVT) and UV Intensity (UVI) values.

The UV sensor values are also provided on the first page. Further, more detailed sensor information is provided in the Force Output menus.

*Note that only the Hallett 1000 models have 2 sets of UV sensors (left and right).*

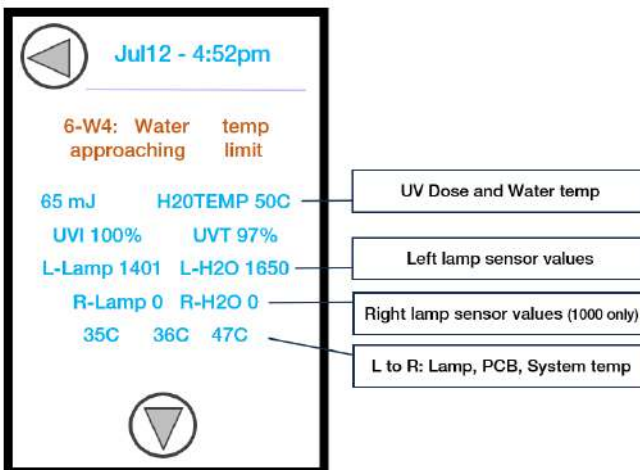
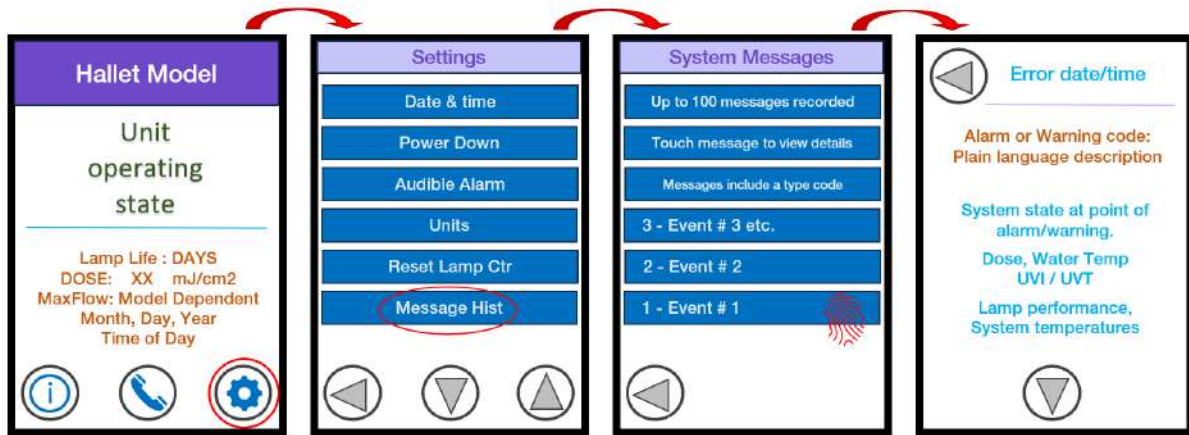
The second page provides various temperatures (also duplicated in Force Output menu page 5 and 6), the time remaining until the next wiper cycle, as well as the number of power cycles\* these sets of lamps have experienced.

The third page has the firmware version of the unit, the total number of starts (cycles) for the lamps\*, the number of lamp starts in the last 24 hours\*, the lifetime of the unit in days (non-resettable counter), and the mA values of the two analog outputs (if the optional 4-20mA/modbus device is installed)

\* Resetting the Lamp Lifetime counter will reset these counters.

## 4. Viewing message history.

When a warning or alarm has occurred, the Hallett unit records the incident in the Message History located in the Settings Menu



Touch the message of interest to view details

In addition to recording which warning or alarm occurred, the unit will record the date and the time, the UV dose, the UVI, the UVT, the UV sensor values in mV, and various temperatures.

Making a manual record of the warnings/alarms list or photos of the screen is recommended

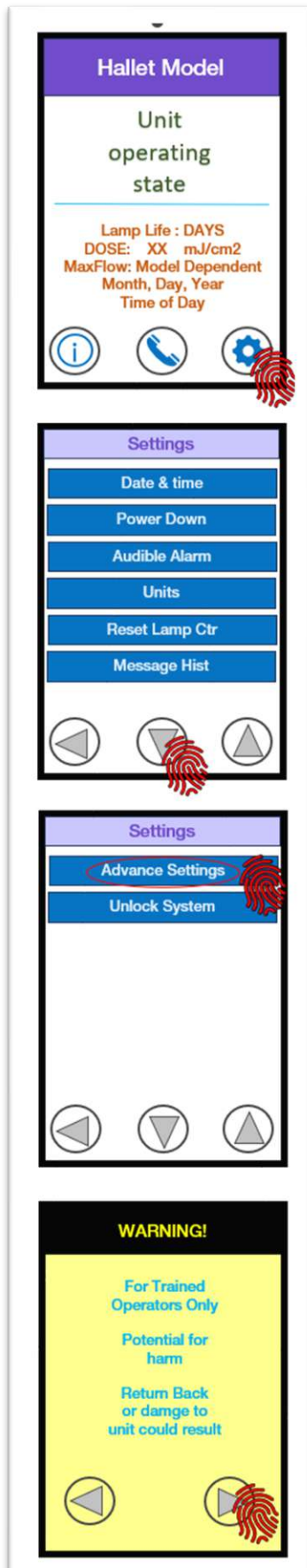
## 5. Force Outputs Menu.

Parameter	500 and 750 models	1000 models
Lamp temp (°C)	27 – 40	30 - 45
Water temp (°C)	8 – 40	8 – 35
System temp (°C)	40 – 51	43 – 56
PCB temp (°C)	28 - 50	30 - 47
Left lamp Sensor (mV)	850 – 1300 *	900 – 1700 *
Left water Sensor (mV)	160 – 1100 **	200 – 1300 **
Right lamp Sensor (mV)	None fitted	900 – 1700 *
Right water Sensor (mV)	None fitted	200 – 1300 **

\*Depends on the age of the lamp

\*\*Depends on the UVT

## Force Outputs Menu Con't

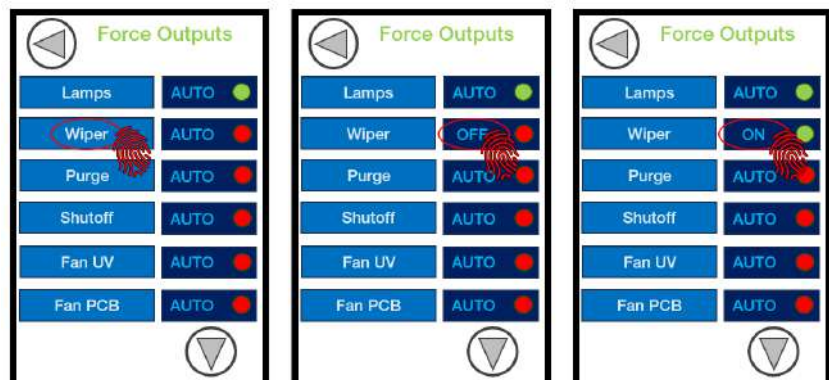


The Force Outputs menu is located in Advanced Settings

There are 5 screens in total.

The first 2 screens allow the technician to activate 10 different outputs

1. Lamps
2. Wiper
3. Purge (valve)
4. Shutoff (solenoid)
5. Fan UV
6. Fan PCB
7. Warning
8. Run
9. Buzzer
10. Heaters



First, tap the name of the output you wish to activate

Next tap the operational state to switch between ON, OFF or AUTO. The colour of the indicator will change depending whether the device is active or not.

All devices return back to their automatic position after 10 minutes.

**It is recommended good practice to leave all devices in 'Auto' mode when exiting the Force Outputs screens.**

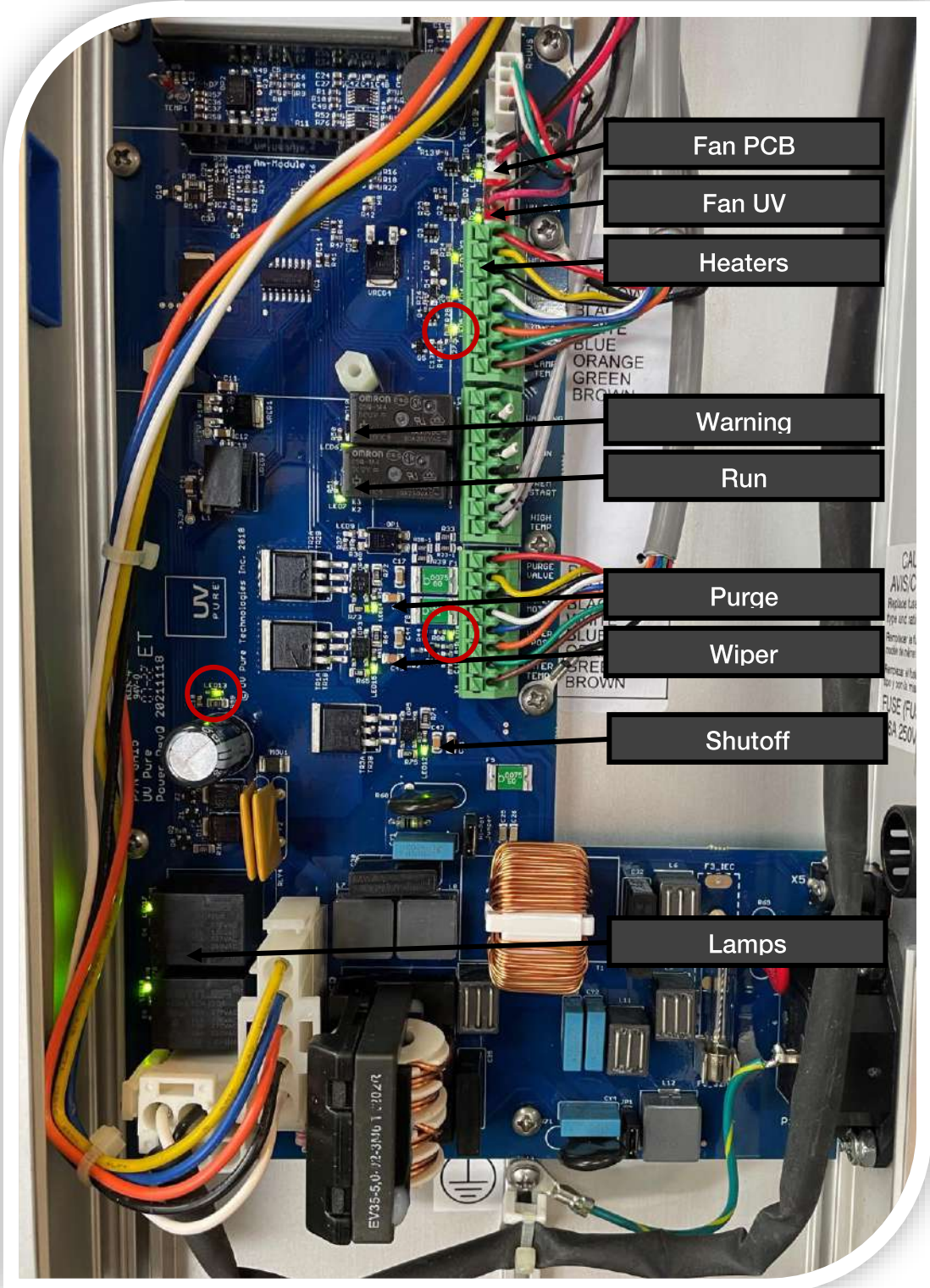


# Force Outputs Menu Con't

In many cases the relay on the power board or device itself will make a noise as it activates

On the power board, are a number of LED's which illuminate when the circuit is active

The three LED's circled in red should be permanently on



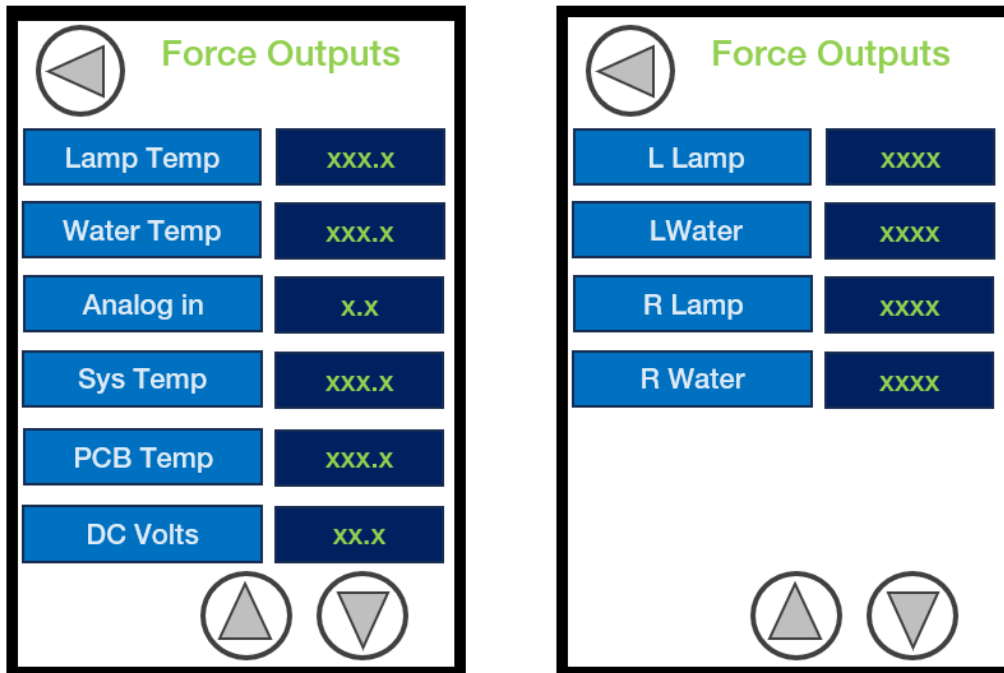


If the LED's come on when the output is forced, you can also check for the voltage at the relevant device connection This ensures the PCB is functional and supplying power to the Device.

If the LEDs don't illuminate and no voltage is present, then the issue is with the PCB.

## Force Outputs Menu - Pages 4 and 5

The 4<sup>th</sup> and 5<sup>th</sup> screens in the force outputs menu provides greater detail and accuracy than that which can be seen in the System Info menu.



## 6. Real time clock keeps resetting

The Real-Time clock is powered by a coin battery locked on the back of the LCD touchscreen.

If the date and time is lost every time the power is cycled, replace battery (3V CR1220).

Fitting a USB stick for manual data logging is strongly encouraged.  
Maximum length 20mm



## 7. ALARMS

### A1 – Low UV Lamp

This alarm is issued when the lamp output being read by the Left Lamp Sensor is low – (value drops below 500mV) but the lamps are still illuminated.

If the lamps are not illuminated, go to alarm A8.

If no alarm has been issued but the UVI values are lower than normal the following information is useful and relevant

Note that UV lamps degrade over time and expect to drop 15-20% of their lifetime.

If alarm A1 – Low UV Lamp occurs, observe the UVI value on the 1st page of the Information Menu and the UV sensor values on the 5th page in the Force Outputs Menu.

#### Lamps are Illuminated - 500 and 750 models

- Ensure genuine UV Pure lamps installed. There is a company logo and red stop sign on the upper ceramic of a genuine UV Pure lamp
- Confirm the UV lamps have been installed correctly with the lamp wires facing the back of the unit (opposite the UV sensors)
- Review the lamp life remaining and replace the lamps if they are approaching or have exceeded the end of lamp life.
- Observe the condition of the lamps and confirm they do not appear burnt or discoloured. This may imply excessive cycling – check the Total Starts counter in the Information menu
- Examine the lamps and UV sensor(s) for dust or dirt. Wipe down with rubbing alcohol and a lint free cloth
- Swap the position of the lamps – left to right and right to left.

If the lamp sensor value increased, but now the water sensor value is low, the right hand lamp has the low output. Replace both lamps and reset the lamp counter.

If after swapping lamps left to right you find both lamps have a low output, it is possible that the lamps may have lost their output capacity sooner than their life expectancy.

Install new lamps and reset lamp counter.

Review the values after the burn-in period has elapsed.

**Note: New lamps may take several hours to burn in.**

- Possible sensor issue.

Is the UV sensor firmly installed into the holder and secured with the plastic blue cams?

Confirm sensor operation by comparing it with a new sensor (see Pg 27). This may be the case if the unit is older than 3 years. Calibration or sensor replacement may be required.

- Check operation of UV fan by turning it on in the first page of Force Output menu
- Operating conditions have exceeded rated conditions – refer to page 6.

If the environment is too hot, add ventilation or air conditioning.

If the environment is too cold, the settings of the lamp heaters can be changed to improve lamp performance

### Lamps are Illuminated - 1000 models

Ensure genuine UV Pure lamps installed. There is a company logo and red stop sign on the upper ceramic of a genuine UV Pure lamps

- Confirm the UV lamps have been installed correctly with the amalgam beads facing the back of the unit (opposite the UV sensors)
- Review the lamp life remaining and replace the lamps if they are approaching or have exceeded the end of lamp life.
- Observe the condition of the lamps and confirm they do not appear burnt or discoloured. This may imply excessive cycling – check the Total Starts counter in the Information menu
- Examine the lamps and UV sensor(s) for dust or dirt. Wipe down with rubbing alcohol
- The top of the lamp may have become loose in the aluminium bracket – caused by the bracket bending during lamp removal/installation. With a set of pliers, gently bend the semi-circular bracket inwards. The top ceramic part of the lamp should be snug in the aluminium bracket.
- Possible sensor issue

Is the UV sensor firmly installed into the holder are secured with the plastic blue cams?

If one of the lamp sensor readings is 0, then there has been a failed communication between the UV sensor and the main microprocessor. **Power down the unit and restart.** If the problem persists, replace the UV sensor.

Confirm sensor operation by comparing it with a new/reference sensor. This may be the case if the unit is older than 3 years. Calibration or sensor replacement may be required.

- Check operation of UV fan using the Force Output menu

Observe the condition of the amalgam beads - see document GH126. If beads have melted or fallen off, the UV lamps are overheating – check operation of the UV fan.

The UV lamps may be overcooled. In the Force Outputs menu, force the UV fan on and observe the left and right lamp sensor readings on the 5th page. If the lamp sensor values are dropping, the lamp(s) is being overcooled.

Swapping the position of the lamps may help or lifting the lamps up slightly on the sockets. Document GH68 provides even more detailed troubleshooting if required.

- The controller may not be turning on one of the ballasts.

During the Lamp Strike sequence, the bottom ballast relay (RLY5) is turned on in the power PCB and then 0.5 seconds later, the upper ballast relay (RLY4) is turned on – two audible clicks can be heard.

Verify both ballast relays have been turned on by confirming the LEDs (LED17 & 18) by the relays are illuminated.

If only one audible click is heard and only one LED is illuminated, one of the ballasts is not being powered up.

This is caused by electrical noise on the communication circuit. In most cases, if the right-hand ballast (& hence right-hand lamp) does not start normally with the left-hand ballast, it will start when the wiper begins its first cycle.

If it is the left-hand ballast not starting up, swap ballast input power connectors at BAL1 & BAL2. If the problem of only one ballast powering up persists, contact UV Pure.

Note if one of these LEDs is not illuminated, it's possible the LED itself could be defective so using a multi-meter, you can measure 230V (or 120V) across the wires of the ballast input power connectors BAL1 & BAL2. This will confirm that power is being delivered to the ballasts.

- One of the lamps or the ballast driving the lamp has failed.

Check that both UV lamps are operational by observing the lamp sensor values in the Force Outputs menu. Note that if the lamp is operating, it will be very hot to the touch – power down the unit, open the UV chamber and feel if both lamps are hot.

- Has the dimming function of the ballasts been activated or have the dimming wires (violet and grey) been shorted?

This will lower the lamp output to 50%.

Document GH95 provides even more detailed troubleshooting if required.

## A2 – I/O Failure

This microprocessor communicates to every input and output device via an Input/Output (I/O) module.

If the microprocessor fails to read and write to the I/O module multiple times, an I/O Failure alarm is issued.

If there are multiple IO failures within a 24 hour period, the microprocessor itself will reset causing the whole unit to restart itself (appears like a power reset).

A high value in the Total Starts counter but a low value in the Power-ups counter implies many lamp restarts due to this communication problem.

**Power down the unit and then reapply the power.** If the problem persists, contact UV Pure.

## A3 – Low UV Dose & Low UV Dose Wiper

Low UV Dose (A3) and Low UV Dose Wiper (A3)

This alarm occurs when the calculated UV dose falls below the prescribed alarm setpoint. The calculated UV dose is a function of the maximum flow of the unit, the UVI of the lamps, and the UVT calculated by the unit ( it is displayed on the main menu in units of mJ/cm2.) The alarm setpoints are model dependent – see table below.

Model	Setpoint (mJ/cm2)	Notes
500P, 750P	40	Max flow setting to match min. UVT
500PN	60	Based on alarming at 75% UVT
750PN	48	Based on alarming at 75% UVT
1000P*	40	Max flow setting to match min. UVT
500W, 750W	30	Max flow setting to match min. UVT
1000W*	30	Max flow setting to match min. UVT
500R, 750R	40	Max flow setting to match min. UVT
1000R*	40	Max flow setting to match min. UVT

\*These values represent the default setpoints however other values are available for custom applications such as 4log virus removal etc. The unit will automatically return to Treatment mode if the UV dose rises above the alarm setpoint.

The most common cause for a Low UV dose alarm is the UV transmission (UVT) of the water being too low for the maximum flow selection of the unit. UVT measurements of the water should be done by an accredited laboratory.

The UVT result should be compared to the capability of the unit. Other than the Hallett 500PN and 750PN, the max flow setting can be reduced to match the UVT – **Note that it is the customer's responsibility to ensure the flow rate through the unit does not exceed the setting indicated on the main menu.**

In the case of the Hallett 500PN and 750PN, the units will alarm at 75% UVT, so the actual UVT should remain comfortably above 80% to reliably remain out of alarm. It is recommended to add pretreatment to increase the UVT if necessary.



For any surface water application, or shallow wells under the influence of surface water, the UVT will vary considerably and will be impacted seasonally. Organic matter (tannins) in the water absorbs the UV light and reduces the UVT of the water.

As the organic matter is dissolved in the water it cannot be filtered out even with 1 micron filters. Equipment such as tannin removal devices may be required for pretreatment.

**If the UVT of the water is better than the minimum requirements of the unit:**

- Inspect the quartz sleeve

If the quartz sleeve is fouled, cleaning may be required in order for the water sensor(s) to see through it unimpeded.

Fouling could suggest the water is near the limit of or outside the recommended specification. Adjustment of the purging temperature and or wiper cleaning frequency may improve the situation.

Replace the quartz sleeve if it is scratched scored or diminished in any way

If the quartz sleeve appears dusty, clean it with a damp, lint free cloth.

- Inspect the surface of the reflectors. If they appear dusty, simply use a water dampened lint free cloth to wipe them off. If the reflectors have become stained or are no longer as shiny as a mirror, they should be replaced.
- Bubbles in the water stream will cause the unit to underpredict the UVT.

Take a sample of water close to the unit – remove the aerator from the tap when taking the sample and let the water run for a few minutes. If air or gas bubbles can be seen, this can trigger the alarm.

Bubbles may be introduced due to the change-out of filters and should be temporary.

Filters requiring oxidation such as iron filters may be injecting too much air and should be readjusted.

Well pumps may be generating two phase. These causes will have the unit alarm while the water is running.

Bubbles in the water stream will not be detected in a UVT sample – this has to be confirmed at the site.

- Excessive condensation on the quartz sleeve will cause the unit to underpredict the UVT. Reduce the humidity in the room where the UV unit is installed.
- Whenever a low UV Dose alarm occurs in the middle of the night or during periods of no water usage, this can also be attributed to a drop in UVT of the water.

When the water remains in the unit under no flow conditions, the temperature increases. As the water temperature increases, minerals such as iron precipitate out changing the UVT. Lowering the temperature setting of the purge valve should solve this problem.

Note: For the Hallett 1000 models, the accuracy of the UVT prediction can be improved – see document GH70.

- Possible sensor issue - confirm sensor operation by comparing it with a new/reference sensor. This may be the case if the unit is older than 3 years. Calibration or sensor replacement may be required (see page 27)
- If the UV Intensity of the lamps is low, refer to alarm Low UV Lamp (A1) Page 10
- Ensure a Wiper Not Turning (W3) warning has not occurred. It is possible that the wiper has stopped functioning and is parked in a way that it is blocking the UV sensors hence underpredicting the UVT.

It is also possible for the wiper positioner switch to malfunction such that it provides false signals to the microprocessor. The switch will acknowledge wiper rotation but will park the wiper in an incorrect spot which blocks the UV sensors hence underpredicting the UVT. This can be an intermittent problem and only revealed if data is collected on a USB drive.

A Low UV Dose Wiper alarm is issued if the UV dose falls below the alarm setpoint during a wiper cycle. When this alarm message is recorded, the values in the message detail may appear to be satisfactory and should not have been responsible for an alarm. However, this is a result of the values placed in the message detail being from before the start of wiper cycle and not precisely at the time of the alarm.

## ***A4 – Lamps not striking***

Shortly after the power is applied to the unit or the Remote Start signal is received, the unit will begin to start the UV lamps. If the lamps do not illuminate, the unit will de-energize the ballast and then try again about 60 seconds later.

Note that even during normal operation of the unit if the UV lamps were to go out, the unit will try to restart the lamps.

If the unit experiences 6 unsuccessful attempts to start the lamps in a 24 hour period, the alarm Lamps Not Striking is issued and the unit will remain in this state **until the power is cycled**.

Note that the preheat ballasts may have up to a 30 second delay from when they are energized to when the UV lamps may illuminate.

- Unplug the unit and inspect the lamps. If they show significant discolouring, replace with new lamps to see if normal startup occurs.
- Verify the lamps they are fully inserted into their lamp sockets and the 4 pins of the lamp firmly engage the socket terminals. It is possible that one of the female terminals of the socket have been pushed down and out of the lamp socket.
- If the lamp pins look corroded from water damage, investigate cause of leak and repair. A water leak may damage the ballast and compromise the lamps.

- Cycle the power to the unit and then observe the UV sensor values on the 5th page in the Force Outputs menu. If there is no change to these values, then it confirms the lamps did not start.

Note that if the lamps did illuminate briefly, the tops of the lamps should feel warm to the touch

There is a small possibility that the UV sensor itself has failed and will not generate any output despite the UV lamps being on.

On 500 & 750 models, visible light can be seen in the area of the UV fan when the lamps have illuminated. If visible light can be seen yet the UV sensor output has not changed, replace the UV sensor.

On the 1000 models, there is both a left and a right UV sensor. If the left hand sensor is unresponsive yet the right hand sensor shows the output changing, swap the UV sensors. If now the right hand sensor is unresponsive, replace the right hand sensor.

- If the UV lamps are truly not illuminating, it could be a UV lamp issue or a ballast issue.

In the majority of the cases, it is usually the UV lamps that have failed. Install a new pair of UV Pure lamps and try again.

If new lamps will not start, replace the ballast.

## **A5 – Microprocessor Failure**

This alarm is a result of an internal malfunction of the main microprocessor.

In some cases, recovery is possible by simply powering down the unit and then restarting

If the problem persists, contact UV Pure.

## **A6 – PCB Temp too High**

This alarm is issued if the temperature of the power PCB reaches 80°C (176°F).

This alarm causes the ballast(s) to de-energize, turning off the UV lamps.

The sensor is a small device soldered directly onto the circuit board. Once the circuit board cools off, the lamps will restart.

If the unit experiences this alarm 6 times in a 24 hour period, the unit will remain off with the message UNPLUG UNIT **until the power is cycled.**

- Check the PCB blower (fan) is functional. Go to the first page of Force Output menu and turn the PCB blower on. If the PCB blower does not function, replace it.

If the PCB blower is functional

Ensure that the inlet filter on the bottom of the unit is clean and free from obstruction as this will impede the airflow into the chamber. Ensure that the room temperature is within specifications

## A7 – System Temp too high

This alarm is issued if the system temperature sensor reaches 80°C (176°F).

This alarm will cause the ballast(s) to de-energize turning off the UV lamps.

This sensor is located on the top middle extrusion just below the black UV shield. Once the unit cools off, the lamps will restart.

If the unit experiences this alarm 6 times in a 24 hour period, the unit will remain off with the message UNPLUG UNIT **until the power is cycled**.

- Check the PCB blower (fan) is functional. Go to the first page of Force Output menu and turn the PCB blower on. If the PCB blower does not function, replace it.

**If the PCB blower is functional**

Ensure that the inlet filter on the bottom of the unit is clean and free from obstruction as this will impede the airflow into the chamber.

Ensure that the room temperature is within specifications

Review the system temperature value on the fourth page of the Force Outputs menu. If the value is 125°C (257°F), this implies an open circuit meaning the sensor is damaged & needs to be replaced.

Look for a System Temp Sensor Failure (W9) message.

## A8 – No Lamp Output

This alarm is issued when the UV lamps were previously on and then the output being read by the Left Lamp Sensor has dropped to very low or has gone out (value drops below 150mV)

This alarm typically accompanies the Low UV Lamp alarm (A1), possibly a the Lamps Not Striking alarm (A4), and perhaps the UV Sensor Failure (A10).

Review these other alarms for more information.

Note that the unit will always try to recover by restarting the UV lamps if they go out.

### 500 and 750 models

Both UV lamps in the Hallett 500 & 750 models are operated by a single ballast and so due to the circuitry, if one lamp goes out, then that would cause the other lamp to go out as well.

- Power down the unit and then plug it in again. Sometimes a brownout could have caused the ballast to drop out and only **a full power cycle will reset it**.
- Review the lamp life remaining and replace the lamps if they are approaching or exceeded the end of lamp life.

- The UV lamps operate for a short period of time then go out. Check if the Total Starts in the Information menu has a high value. It's possible to have either a defective set of UV lamps or a defective ballast. Since it is more likely the UV lamps are likely defective, install new lamps and reset lamp counter. If problem persists with the new lamps then the ballast is suspect. This implies the previous set of lamps are likely to be ok.
- If it appears the UV lamps are starting but the UV sensor is unresponsive, then the UV sensor has failed and needs to be replaced.

## 1000 models

Each UV lamp in the Hallett 1000 has its own ballast. It is possible for one lamp to be one while the other is not.

- Power down the unit and then plug it in again. Sometimes a brownout could have caused the ballast to drop out and only **a full power cycle will reset it.**
- Review the lamp life remaining and replace the lamps if they are approaching or exceeded the end of lamp life.
- If it appears the UV lamps are starting but the left UV sensor is unresponsive, then perhaps the left UV sensor has failed. Power down the unit and swap UV sensors. Power up the unit and if the right UV sensor is unresponsive, it needs to be replaced.

- The UV lamps operate for a short period of time then go out.

Check if the Total Starts in the Information menu has a high value. Since this alarm is focused on the left hand lamp, and since each lamp has its own ballast, swapping lamp positions can reveal a lamp or ballast defect.

After swapping lamps, observe the Lamp UV sensor values in the Force Output menu. If the left lamp is on but the right lamp is not on, then the lamps was defective. If the left lamp turns on but then goes out or if it does not start, then the left ballast is defective.

- Possibly the controller is not turning on one of the ballasts.

During the Lamp Strike sequence, the bottom ballast relay (RLY5) is turned on in the power PCB and then 0.5 seconds later, the upper ballast relay (RLY4) is turned on – two audible clicks can be heard.

Verify both ballast relays have been turned on by confirming the LEDs (LED17 & 18) by the relays are illuminated.

If only one audible click is heard and only one LED is illuminated, one of the ballasts is not being powered up.

This is caused by electrical noise on the communication circuit.

In most cases, if the right-hand ballast (& hence right-hand lamp) does not start normally with the left-hand ballast, it will start when the wiper begins its first cycle. If it is the left-hand ballast not starting up, swap ballast input power connectors at BAL1 & BAL2. If the problem of only one ballast powering up persists, contact UV Pure.

Note if one of these LEDs is not illuminated, it's possible the LED itself could be defective so using a multi-meter, you can measure 230V (or 120V) across the wires of the ballast input power connectors BAL1 & BAL2. This will confirm whether power is being delivered to the ballasts.



## A9 – Door open

This alarm is issued if the UV chamber door is open or suddenly becomes open during operation. If the unit experiences this alarm 6 times in a 24 hour period, the unit will remain off with the message UNPLUG UNIT **until the power is cycled.**



Warning – If the UV chamber is open and the UV door interlock is engaged while the power is on, the UV lamps can start creating a UV light hazard. Unplug the ballast(s) before any troubleshooting of the interlock is done with the power on – this will prevent the UV lamps from starting.

- Confirm that all latches to the UV chamber are fully engaged in the closed position while gripping the rear extrusion
- Check the condition of the safety switch activation arm located on the bottom right of the UV chamber to ensure isn't bent or damaged.

When the activation arm enters the recessed area that houses the safety switch, an audible click can be heard when the switch is depressed.

This input can also be seen on the third page of the Force Outputs menu – green LED means switch is closed, red LED means switch is open.

- Power down the unit. Unplug the ballast(s). Power up the unit again.

Open the UV chamber and engage the interlock switch with a small screwdriver.

If pressing on the interlock switch clears the alarm, then this confirms the interlock switch and associated wiring works. The problem is likely the activation arm has to be bent slightly to the left or right in order to strike the switch.

If pressing on the interlock switch does not clear the alarm, check that the orange and blue wires are fully inserted in their respective terminals marked INTER-LOCK. If wires are secure, replace interlock switch.

## A10 – UV Sensor Failure

This alarm is issued if the microprocessor loses communication with the UV sensor array. This alarm will usually cause the UV lamps to turn off. If the unit experiences this alarm 6 times in a 24 hour period, the unit will remain off with the message UNPLUG UNIT **until the power is cycled.**

- Ensure a good connection between the sensor(s) and the main circuit board by checking each end of the wire harness between the sensor and the main circuit board.

1000 model. Try swapping the UV sensors left to right & vice versa. If the problem follows the sensor, it is a sensor problem and it should be replaced. If the problem persists in the same position, it is likely the wire harness and it should be replaced.

500 or 750 model, try replacing the sensor. If the unit is now functional, the UV sensor was at fault

If the problem persists, it is likely the wire harness and it should be replaced.

If the UV sensor alarm is intermittent, contact UV Pure.

## **A11 – Water temp too high (1000 only)**

This alarm is issued if the water temperature sensor reaches 45°C (113°F).

This alarm will cause the ballast(s) to de-energize turning off the UV lamps. Normally, this alarm would be accompanied with a warning first indicating the water temperature is approaching the limit.

This sensor is located on the top stainless steel casting, on the left hand side. Once the water cools below 35°C (95°F), the lamps will restart.

If the unit experiences this alarm 6 times in a 24 hour period, the unit will remain off with the message UNPLUG UNIT **until the power is cycled**.

- Ensure the purge valve is operational by turning it on in the first page of the Force Outputs menu (to determine whether an electrical or mechanical issue)

If the purge valve does not open, check all wiring connections.

The purge valve and wiper motor operate on 24Vac. Check if the wiper is working. If the wiper works, swap both wires feeding the wiper motor to the wires feeding the purge valve and vice versa. Now check if both devices work.

If the purge valve now works and the wiper motor does not, it is a wiring problem on the purge valve circuit.

If the purge valve still does not work and the wiper motor works, swap the wires back and replace purge valve. Note that its likely only the coil that needs to be replaced, not the whole body.

If the wiper did not turn before switching the wires, it may be a problem with the 24Vac supply coming from the transformer. This would imply the optional shutoff valve would also fail to energize without this voltage. Replace transformer.

- If the purge valve does open when forced ON (or clicking of coil is heard)

Check for blockage in discharge tubing

Ensure there is a minimum of 5 PSI in the water supply which is necessary to exchange the water within the unit

Ensure incoming water temperature is low enough to sufficiently cool the system

There could be debris blocking flow within the purge valve. Disassembly of the valve & cleaning of the internal components may be required – see document GH133.

The purge valve may be stuck in the closed position. Disassembly of the valve & cleaning of the internal components may be required – see document GH133.

- Review the water temperature value on the fourth page of the Force Outputs menu. If the value is 125°C (257°F), this implies an open circuit so the sensor is damaged & needs to be replaced.

Look for a Water Temp Sensor Failure (W6) message.

## ***A12 – 4-20mA Signal Failed (1000 only)***

This alarm is issued if the flow input signal selection is the 4-20mA and the value of the signal drops below 3mA.

Since the UV dose cannot be calculated without a flow value, the RUN contact opens and the shutoff solenoid valve (if installed) is de-energized however, the UV lamps remain energized.

- Investigate the cause of the loss of the 4-20mA input signal – the mA value can be seen on the fourth page of the Force Outputs menu
- Change the flow input to keypad and set maximum flow value until the analogue input signal returns

## **8. WARNINGS**

### ***W1 – End of Lamp Life Approaching***

This warning is issued when there are 30 days remaining on the UV lamp lifetime counter.

- Check if spare UV lamps are readily available. If not, order a new set of replacement UV lamps.
- After new lamps are installed, reset lamp counter in the Settings menu

### ***W2 – Lamp cycling too often***

This warning is issued if the UV lamps are cycled more than 12 times in a 24 hour period (preheat ballasts).

Caution: Prevent excessive starting and stopping of the lamps. Lamp cycling should be limited to 12 times per day otherwise the lamps will age prematurely (preheat ballasts only)

- Review the third page of the Information menu for Daily Starts
- If the Remote Start/Stop feature is used, reduce the number of starts
- Review the second page of the Information menu for Power Ups. If there is an excessive number of power interruptions, install an uninterruptable power supply (UPS) to prevent brownouts or blackouts – see document XH109

## W3 – Wiper not turning

This warning is issued if the system cannot detect the rotation of the wiper motor whether it is initiated automatically or manually.

On the wiper motor shaft sits a plastic cam that activates a position switch during every rotation - the switch should open and close during rotation. Remove the top plastic blue cover to observe the motor and associated components.

- In the first page of the Force Outputs menu, turn on the wiper motor
- Visually confirm if the wiper is rotating – the plastic cam should be rotating slowly CCW at 1 RPM

### If no rotation is detected

Confirm the wire connections to the motor and the connections on the main circuit board labelled "Wiper Motor"

The wiper motor and purge valve operate on 24Vac. Check if the purge valve is working. If the purge valve works, swap both wires feeding the wiper motor to the wires feeding the purge valve and vice versa. Now check if both devices work.

If the wiper motor now works and the purge valve does not, it is a wiring problem on the wiper motor circuit.

If the wiper motor still does not work and the purge valve is working, then wiper motor circuit is good – swap the wires back.

If the purge valve also does not operate it may be a problem with the 24Vac supply coming from the transformer. This would imply the optional shutoff valve would also fail to energize without this voltage. Replace transformer.

Remove the wiper motor from the two posts and turn the wiper shaft + cam CCW with a flat bladed screwdriver

If there is little resistance then the motor has failed and it should simply be replaced. Note that on the third page of the Force Outputs menu you can observe the wiper position switch change status as the position switch moves against the cam. By observing the LED change colour from red to green confirms the sensing circuit is working.

If there is significant resistance to rotating CCW, i.e. it is binding, then dirt/debris has likely accumulated inside the unit where the bottom of the wiper shaft sits in the bottom casting. Disassemble the bottom casting to clean it out and replace the wiper motor.

- If rotation is detected but the warning remains, replace the wiper motor position switch.

## W4 – Water Temp Approaching Limit

This warning is issued if the water temperature sensor reaches 40°C (104°F) for the 500 & 750 models or 35°C (95°F) for the 1000 model for more than 2 minutes.

This sensor is located on the top stainless steel casting, on the left hand side.

- Ensure the purge valve is operational by turning it on in the first page of the Force Outputs menu (to determine whether an electrical or mechanical issue)

If the purge valve does not open,

Check all wiring connections.

The purge valve and wiper motor operate on 24Vac. Check if the wiper is working. If the wiper works, swap both wires feeding the wiper motor to the wires feeding the purge valve and vice versa. Now check if both devices work.

If the purge valve now works and the wiper motor does not, it is a wiring problem on the purge valve circuit.

If the purge valve still does not work and the wiper motor works, swap the wires back and replace purge valve. Note that its likely only the coil that needs to be replaced, not the whole body.

If the wiper did not turn before switching the wires, it may be a problem with the 24Vac supply coming from the transformer. This would imply the optional shutoff valve would also fail to energize without this voltage. Replace transformer.

If the purge valve does open when forced ON (or clicking of coil is heard)

Check for blockage in discharge tubing

Ensure there is a minimum of 5 PSI in the water supply which is necessary to exchange the water within the unit

Ensure incoming water temperature is low enough to sufficiently cool the system

It may be necessary to open the purge valve for longer periods of time to cool the unit – see document GH79 to extend duration of purge or delay when the warning is issued.

There could be debris blocking flow within the purge valve. Disassembly of the valve & cleaning of the internal components may be required – see document GH133.

The purge valve may be stuck in the closed position. Disassembly of the valve & cleaning of the internal components may be required – see document GH133.



## **W5 – System Temp Approaching Limit**

This warning is issued if the system temperature sensor reaches 70°C (158°F).

This sensor is located on the top middle extrusion just below the black UV shield.

- Examine if the PCB blower (fan) is functional.

Go to the first page of Force Output menu and turn the PCB blower on.

If the PCB blower does not function,

replace PCB blower.

If the pcb blower is functional

Ensure that the inlet filter on the bottom of the unit is clean and free from obstruction as this will impede the airflow into the chamber.

Ensure that the room temperature is within specifications

## **W6 – Water Temp Sensor Failure**

This warning is issued if the system detects a failure in the water temperature sensor (thermistor) circuit.

This sensor is located on the top stainless steel casting, on the left hand side.

Review the water temperature value on the fourth page of the Force Outputs menu. If the value is 125°C (257°F), this implies an open circuit.

Check the wires connections at both the sensor and at the terminals marked WATER TEMP

If wire connections are secure, the sensor is damaged & needs to be replaced.

## **W7 – Lamp Temp Sensor Failure**

This warning is issued if the system detects a failure in the lamp temperature sensor (thermistor) circuit.

This sensor is located inside the UV chamber on the bottom lamp holder bracket.

Review the lamp temperature value on the fourth page of the Force Outputs menu. If the value is 125°C (257°F), this implies an open circuit.

Check the wire connections at both the sensor and at the terminals marked LAMP TEMP

If wire connections are secure, the sensor is damaged & needs to be replaced.

## ***W8 – PCB Temp Sensor Failure***

This warning is issued if the system detects a failure in the PCB temperature sensor (thermistor) circuit.

This sensor is a soldered in component located near the top of the power PCB marked TEMP1.

Review the PCB temperature value on the fourth page of the Force Outputs menu.

If the value is 125°C (257°F), this implies an open circuit.

There are no wire connections in this circuit. To replace the sensor, the power PCB needs to be replaced.

## ***W9 – System Temp Sensor Failure***

This warning is issued if the system detects a failure in the system temperature sensor (thermistor) circuit.

This sensor is located on the top middle extrusion just below the black UV shield.

Review the lamp temperature value on the fourth page of the Force Outputs menu. If the value is 125°C (257°F), this implies an open circuit.

Check the wires connections at both the sensor and at the terminals marked HIGH TEMP

If wire connections are secure, the sensor is damaged & needs to be replaced.

## ***W10 – Lamp Lifetime Exceeded***

This warning is issued when there are 0 days remaining on the UV lamp lifetime counter. The Hallett unit will continue to operate and treat the water properly provided the UV dose remains above the alarm setpoint.

It is recommended to replace UV lamps as soon as possible since if the UV lamps were to go out, they may not restart.

Install new lamps and reset lamp counter in the Settings menu

## 9. No Power to the unit or it appears unresponsive

When the unit is plugged in and operational, the LCD screen may be blank while in sleep mode but there should always be illumination of the LED just above LCD screen.

Note that when the power is cycled to the unit, the unit will begin with a self-diagnostic including a chime and cycling through both the green and red colours of the LED.

### **If the LED is illuminated:**

Touch a corner of the LCD

If the screen illuminates, it was likely in sleep (screen saver) mode

If the screen remains dark, cycle the power to the unit to see if it returns to normal.

If the screen remains dark, replace the LCD/microcontroller (MCUD)

### **If the LCD screen is on but is unresponsive or lagging.**

This may be caused by the touchscreen too tightly compressed to the gasket.

Power down the unit and slightly loosen the four screws securing the MCUD to the rails of the extrusion.

Power up the unit and see if the screen returns to normal.

If the problem persists, replace the MCUD.

### **If the LED is not illuminated:**

Check if there is power to the unit by measuring voltage at the female side of the power cord.

If there is no input voltage, check if a GFI or circuit breaker has tripped

If input voltage is present at the power cord, check if fuse is blown in the power PCB.

If the fuse is blown, inspect the unit for any damage or water leaks etc.

Before replacing fuse, disconnect the 5 pole connector that connects to low voltage transformer. Power up the unit and see if fuse is still good. Power down the unit, re-install the 5 pole connector and power up again. If the fuse blows, the transformer needs to be replaced

If fuse is good, check if LEDs on the power PCB are illuminated.

If some LEDs are on, then it could be a loose connection of the ribbon cable between the power PCB and the touchscreen LCD/microcontroller (MCUD). If the connections are secure it is likely the MCUD is damaged and needs to be replaced.

If no LEDs are on, measure the voltages on the 5 pole connector. There should be 230V (or 120V) on the bottom 2 terminals that supply voltage to the transformer.

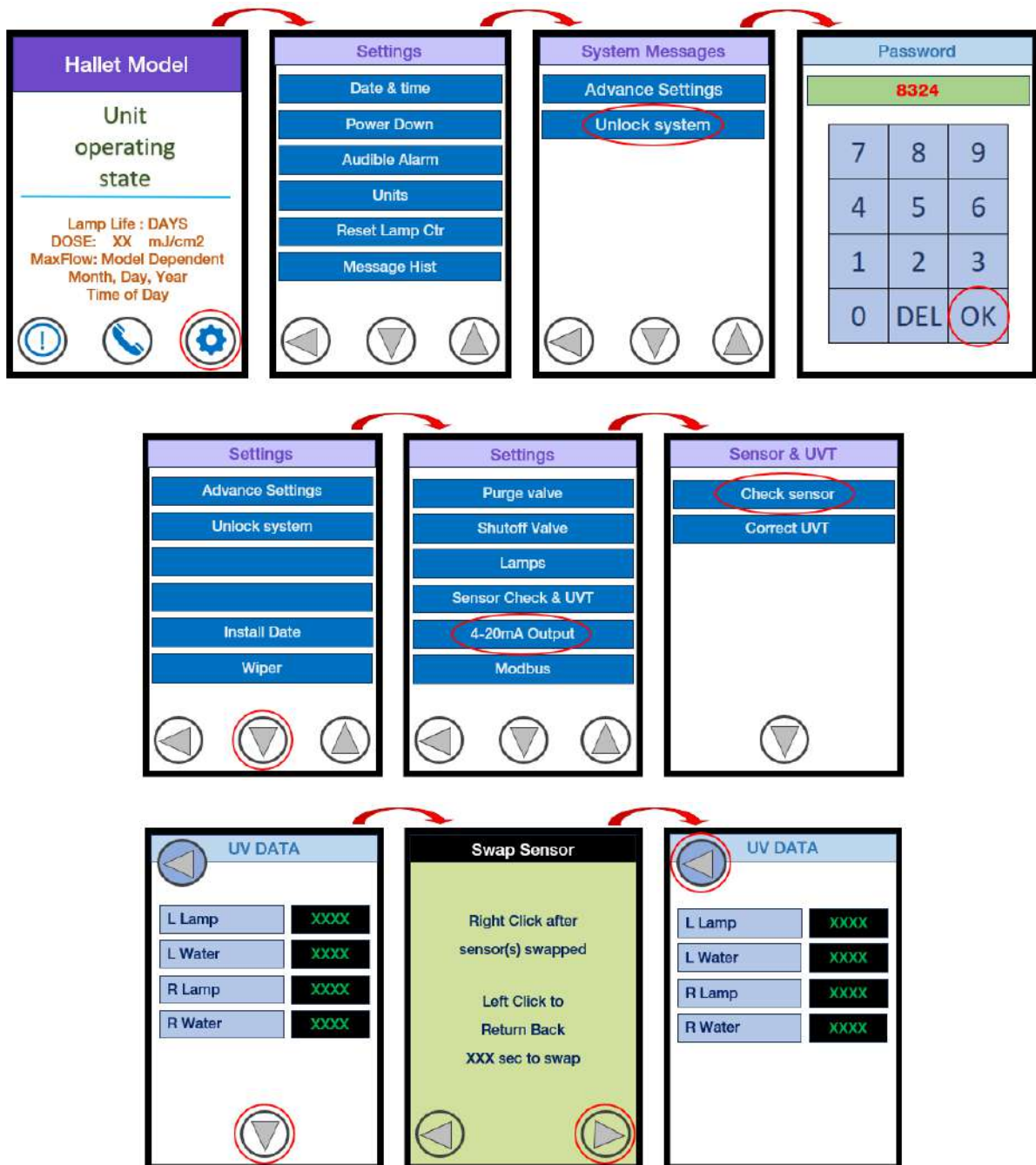
If there is no voltage here, the power PCB needs to be replaced.

If there is voltage here, confirm if 24Vac is returning from the low voltage transformer at the 2nd and 3rd terminal from the top of the 5 pole connector. If there is no 24Vac, the transformer is damaged and needs to be replaced.

Check if the fuse is loose in its holder, it may be making poor contact.

If the 4-20mA/MODBUS device was recently installed, it could be misaligned. Power down the unit and closely examine that the pins are properly aligned.

## 10. UV sensor reference check



With the sensor removed, UV light from the lamps is visible. Exercise caution. Do not look inside the chamber

## 11. Reflectance check (Hallett 1000 only)

The reflectance test, applicable only to H1000 models, should be carried out when strict adherence to the DVGM standard is required.

[Contact White International prior to undertaking these checks](#)

The purpose of the reflectance check is to examine if the performance of the reflectors within the UV chamber has diminished. The check involves recording the four UV sensor values with both lamps on, then with the left lamp on, then with the right lamp on.

A value less than 0.92 will begin to negatively impact the UV dose calculated by the Hallett 1000 unit (decreases RED by 5%).

Technical document [GH100 – Reflectance Check Procedure](#) details how to collect the necessary information.

A spreadsheet provided by UV Pure (GH100.xlsx) will calculate the reflectance.

Technical document [GH102 – Applying Reflectance, RED \(Technicians only\)](#) explains how to apply any correction

## Data logging

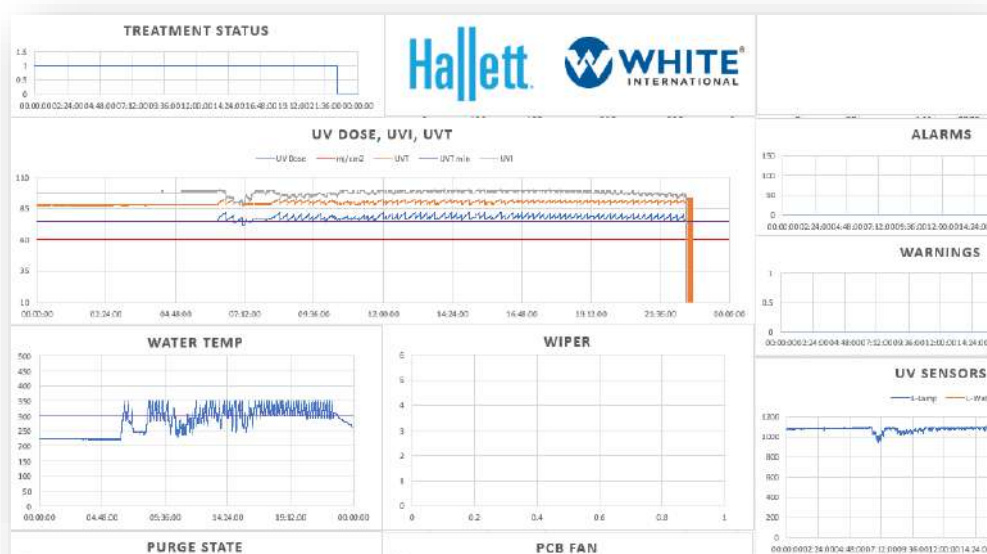
When a USB stick is fitted to the back of the display a CSV format log file is generated.

A fresh line of all parameters is recorded every second. Each file is 24 hours duration

When the USB stick is full, the oldest file is over-written

By analysing the data the possible causes can be identified accurately and quickly.

Contact White International for assistance with log file analysis





System Status	Possible Cause	Corrective Action
No Power: LED off, Touchscreen off	Ground-fault circuit-interrupter (GFCI) tripped.	Check for water leaks. Reset GFCI.
	Fuse Blown.	Check for water leaks. Replace fuse
	Touchscreen PCB not connected to power CB.	Ensure ribbon cable is connected at both ends
	Circuit Board is damaged.	Confirm if the main power board has illuminated LEDs. If yes, replace Touchscreen PCB (LCD).
UV Lamps not starting: occurs after 6 unsuccessful attempts	UV Chamber interlock not engaged.	Check that each latch is correctly positioned and secure UV chamber door.
	Number of lamp starts have exceeded specification.	Review Total Lamp starts in System Info Menu. Replace lamps but reduce future lamp cycles.
	UV lamp failure	Replace lamps
	UV Ballast Failure	Replace ballast
	Over temperature condition.	Either the system, PCB or water temperature has occurred. Allow to cool off and investigate cause by reviewing Message History.
UV Lamps on but UVI is low	Lamps are warming up after a power interruption.	Allow lamps up to 15 minutes to reach full power
	New LPHO lamps installed. 500 and 570 models	First time LPHO lamps are turned on it may take 3 to 4 hours to reach full power. After this initial "burn-in", warmup time will be a few minutes.
	The UV output of the lamps have diminished.	Lamps have exceeded their lifetime. Replace lamps.
		Number of lamp starts have exceeded specification. Replace lamps but reduce future lamp cycles.
	UV sensor requires recalibration/replacement.	Install reference sensor to confirm status of unit sensor.
	UV Lamps operating outside of recommended temperature conditions.	Check if UV blower is operating correctly.
For cold water applications, increase room temperature or install LPHO lamp heater kit.		
High Water Temperature Warning & Alarm	<p><b>Hallett 500 and 570</b> Warning issued when water temperature within the UV chamber exceeds 40°C.</p> <p><b>Hallett 1000</b> Alarm issued when water temperature within the UV chamber exceeds 122°50°C – UV Lamps are turned off</p>	<p>Ensure sufficient water pressure is available to operate purge valve. (0.5 bar) Check for blockage in purge discharge tubing. Check for debris in purge valve.</p>
High System Temperature Warning & Alarm	The system temperature has exceeded a safe operating level causing the UV lamps to be turned off.	Check if water flow has been turned off. Check if operating temperatures have exceeded specifications. Check if both system blowers are operating correctly.
Circuit Board Temperature High Alarm	The temperature within the electrical chamber has exceeded a safe operating level causing the UV lamps to be turned off.	Check if operating temperatures have exceeded specifications. Check if the PCB blower is operating.
Wiper Not Turning Warning	The system has failed to detect wiper motion during the routine wiper cycle.	Check wiper motor operation
		Check wiper position switch & cam.
		The UVT is too low for detection.



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